



## NASA STTR 2014 Phase I Solicitation

### T10.01 Lightweight Structural Nanomaterial Concepts

Lead Center: LaRC

Carbon fiber reinforced polymeric (CFRP) composites are considered state of the art (SOA) for lightweight aerospace structural materials. However, a systems study suggests that having specific mechanical properties that exceed CFRPs by 2-4x will yield significant savings in launch vehicles. Currently, SOA nanomaterials with potential to supplant CFRPs as the lightweight structural material of choice are available in formats possessing mechanical properties far below those measured at the nanoscale. These excellent nanoscale properties have to be demonstrated at scales that permit the evaluation of these materials in structural components with properties that offer mass advantage over CFRPs. Proposals are sought in the following areas:

- Innovative approaches to chemically and/or physically enhance load carrying capability of nanomaterials and influence their macroscale mechanical properties as demonstrated by structural properties on the coupon scale that are at least double the specific strength and stiffness of epoxy CFRPs.
- Manufacturing methods that permit the control of nanostructures at the molecular level to induce structural perfection of such structures as to produce articles at the coupon scale which possess mechanical properties that are at least double those measured for epoxy CFRPs.